

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
14 July 2005 (14.07.2005)

PCT

(10) International Publication Number  
**WO 2005/064759 A1**

(51) International Patent Classification<sup>7</sup>: **H02H 7/045**

(21) International Application Number:  
PCT/SE2004/001997

(22) International Filing Date:  
22 December 2004 (22.12.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
0303615-9 31 December 2003 (31.12.2003) SE

(71) Applicant (for all designated States except US): **ABB AB**  
[SE/SE]; Kopparbergsvägen 2, S-721 83 Västerås (SE).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **GAJIC, Zoran**  
[SE/SE]; Regementsgatan 59, S-723 45 Västerås (SE).  
**BRNCIC, Ivo** [SE/SE]; Fårövägen 4, S-722 44 Västerås  
(SE).

(74) Agent: **ABB AB**; Legal & Compliance/Intellectual Prop-  
erty, Forskargrand 8, S-721 78 VASTERAS (SE).

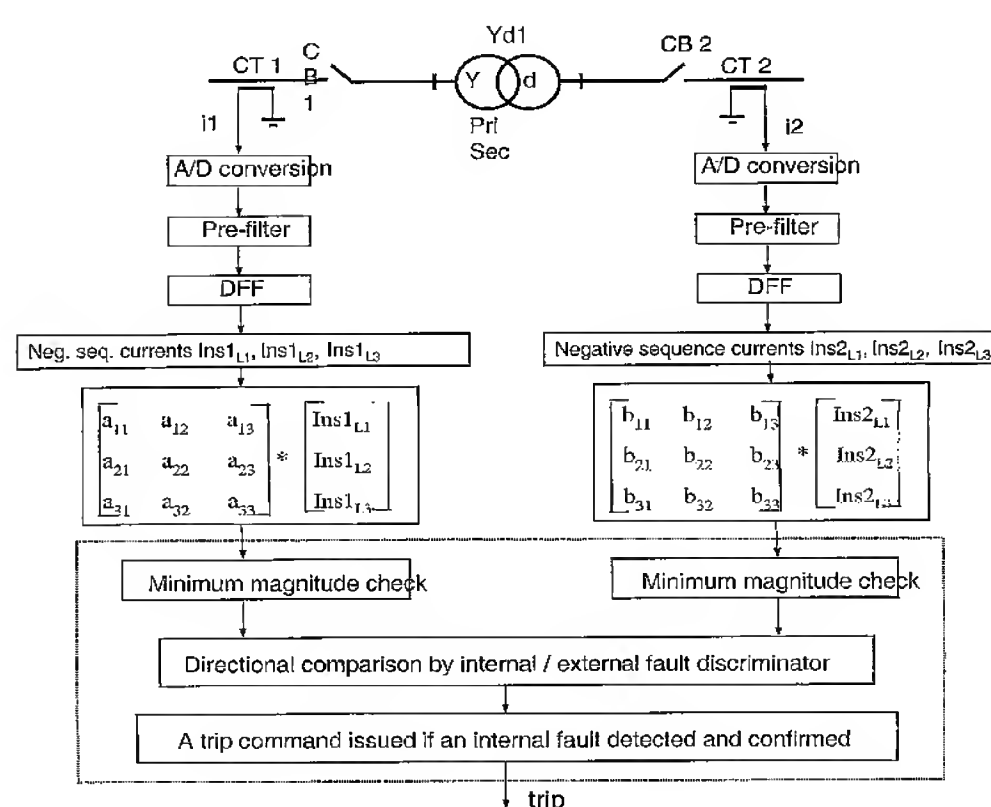
(81) Designated States (unless otherwise indicated, for every  
kind of national protection available): AE, AG, AL, AM,  
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,  
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,  
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,  
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,  
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,  
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,  
TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM,  
ZW.

(84) Designated States (unless otherwise indicated, for every  
kind of regional protection available): ARIPO (BW, GH,  
GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,  
ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),  
European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,  
FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO,  
SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN,  
GQ, GW, ML, MR, NE, SN, TD, TG).

**Published:**  
— with international search report

For two-letter codes and other abbreviations, refer to the "Guid-  
ance Notes on Codes and Abbreviations" appearing at the begin-  
ning of each regular issue of the PCT Gazette.

(54) Title: METHOD AND DEVICE FOR FAULT DETECTION IN TRANSFORMERS OR POWER LINES



(57) Abstract: The invention refers to method for fault detection in a power transformer/autotransformer and/or interconnected power lines, which are within the zone protected by the differential protection, and particularly suitable for detecting turn-to-turn faults in power transformer/autotransformer windings. The method according to the invention is achieved by measuring all individual instantaneous phase currents of the protected object, calculating individual phase currents as fundamental frequency phasors, calculating the contributions of the individual protected object sides negative sequence currents to the total negative sequence differential current by compensating for the phase shift of an eventual power transformer within the protected zone, comparing the relative positions of the compensated individual sides negative sequence currents in the complex plane, in order to determine whether the source of the negative sequence currents, i.e. the fault position, is within the protected zone or outside of the protected zone, delimited with current transformer locations, disconnecting the protected object if determined that the source of the negative sequence currents is within the protected zone.

WO 2005/064759 A1